

DRAFT

Ashford and Miller (1989. Chemical Sensitivity, a Report to the New Jersey State Department of Health) have summarized studies that were conducted to link multiple chemical sensitivity to exposure to VOCs and other organic compounds.

In a protocol described in a paper by B. Siefert (Regulating Indoor Air, Indoor Air '90 Proceedings of the 5th International Conference on Indoor Air Quality, Vol. 1, Ottawa, 1990) total VOC concentrations indoors greater than $300 \mu\text{g}/\text{m}^3$ are a point of concern to occupants. Total VOC concentration exceeded $300 \mu\text{g}/\text{m}^3$ at 5237 Sun Valley Court in Clarkston, Michigan.

A major difficulty when attempting to identify sources of emissions in buildings is that some porous indoor building materials act as sinks for VOCs from other sources. That is, VOCs from one source may adsorb to the surface of a porous material in the room. When the porous surface is ventilated by clean air, the VOC will be emitted into the room air.

While it is possible that the screening material manufactured by Phifer Wire Products, Inc. and installed in these three homes did contribute to the potential occupants' overall exposure to VOCs, the sampling does not clearly indicate that the screen material is the single or even the major contributor.

At the home located at 6859 Tanglewood Street in Waterford, 12 window screens were placed in a secluded sealed room at an elevated temperature (82°F). This increased temperature would increase the offgassing of compounds into the room air. Results of analysis of samples collected in this room indicated VOC concentrations comparable to the concentrations found in the other two homes and those concentrations noted in the research cited in this section.

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April 13, 1993

APPENDIX A

DIRECT-READING MEASUREMENTS

**Direct-Reading Measurements
at
Three Homes
in
Clarkston and Waterford, Michigan
for
Phifer Wire Products, Inc.
Tuscaloosa, Alabama**

Clayton Project No. 45870.00

Measurement Date: January 18, 1993

| Location | Military Time | Temperature (F°) | Relative Humidity (%) | Carbon Dioxide (ppm) ^a | Airborne Particulate (µg/m ³) ^b |
|--|---------------|------------------|-----------------------|-----------------------------------|--|
| <u>Outdoors</u> | 1015 | 28 | 63 | 300 | 9 |
| 6710 Sun Valley Drive | 1030 | 78.5 | 26.1 | 400 | 20 |
| 5237 Sun Valley Court | 1352 | 75.2 | 22.0 | 450 | 10 |
| 6859 Tanglewood | 1240 | 73.8 | 20.5 | 400 | 10 |
| Basement storage room 6859 Tanglewood (Temperature maintained for air sampling) | 1240 | 82.5 | 19.0 | 400 | 11 |
| Outdoors | 1600 | 27 | 61 | 300 | 7 |

- ^a parts of carbon dioxide per million parts of air, on a volume-to-volume basis
^b micrograms of particulate per cubic meter of air, on a weight-to-volume basis

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APPENDIX B
EVALUATION CRITERIA

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The following criteria were used to evaluate the indoor air quality in the three homes.

VENTILATION SYSTEM

American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc. (ASHRAE) Standard 62-1989 (Ventilation for Acceptable Indoor Air Quality, Atlanta, 1989) recommends that outdoor air should be supplied to the breathing zone at a flowrate of at least 15 to 20 cubic feet per minute (cfm) per occupant. The occupied space in living areas should be supplied with sufficient outdoor air to assure the air pressure differential is slightly positive relative to the outdoor atmosphere.

CARBON DIOXIDE

Carbon dioxide has been widely used in the industrial hygiene community as a surrogate for various occupant-generated indoor contaminants, such as cigarette smoke and bioeffluents, that are known to cause annoyance, irritation, or discomfort among building occupants (P. Morey, W. Jones, J. Clere, et al., "Studies on Sources of Airborne Microorganisms and on Indoor Air Quality in a Large Office Building." IAQ '86 *Managing Indoor Air for Health and Energy Conservation*. ASHRAE, Atlanta, 1986, pp. 500-509).

For buildings or zones of buildings where air cleaning to remove smoke and bioeffluents is not provided, performance criteria establishing a limit of 1,000 parts per million (ppm) carbon dioxide (equivalent to about 15 to 20 cfm outdoor air per occupant) are recommended to satisfy occupant comfort needs.

AIRBORNE PARTICULATE

ASHRAE Standard 62-1989 recommends that levels of total particulate in outdoor air entering a building not exceed the United States Environmental Protection Agency (USEPA) National Ambient Air Quality Standards (NAAQS) of 75 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). Air containing higher levels of particulate must be filtered to bring particulate levels within guidelines.

An addendum to Standard 62-1989 (Addendum to Ventilation for Acceptable Indoor Air Quality) recommends that, in accordance with the Clean Air Act of 1987, levels of respirable particulate (particles of less than 10 micron aerodynamic diameter) not exceed 50 $\mu\text{g}/\text{m}^3$ in outdoor air entering a building.

Clayton has set maximum indoor air concentration guidelines for total suspended particulate at 75 $\mu\text{g}/\text{m}^3$ and for respirable particulate at 50 $\mu\text{g}/\text{m}^3$. These evaluation criteria reflect our view that performance guidelines for indoor air should at a minimum comply with provisions of the Clean Air Act (USEPA-NAAQS) for outdoor air.

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THERMAL ENVIRONMENTAL PARAMETERS

ASHRAE Standard 55-1992R (Thermal Environmental Conditions for Human Occupancy, Atlanta, 1992) defines the environmental conditions that most (90 percent or more) sedentary occupants in indoor environments will find satisfactory. Performance criteria that are established in this standard include the following recommendations for operative temperatures in the occupied spaces: 73 to 78.5°F at 60 percent relative humidity (summertime conditions); 69°F to 76°F at 30% relative humidity (wintertime conditions).

Clayton considers the broad range of relative humidity from 30 to 60 percent as most acceptable for occupant comfort in office environments. Wintertime relative humidities in the 20 to 30 percent range are marginally acceptable but may cause discomfort to sensitive individuals. Humidities below 20 percent are unacceptable because of the effect of dry air on both the mucous membranes and the skin (P. Morey and J. Woods "Indoor Air Quality in Health Care Facilities." *Occupational Medicine: State of the Art Reviews* 2, 547-563, 1987).

To provide a comfortable living environment during the summer, relative humidity should not exceed 60 percent. Relative humidities greater than 60 percent and certainly those above 70 percent are conducive to the proliferation of microbial agents, such as fungi. Clayton considers the upper and lower dew point limits of 62 and 35°F, respectively, acceptable based on considerations of thermal comfort, respiratory health, and mold growth.

APPENDIX C
RESULTS OF SAMPLING AND ANALYSIS

Table 1
Results of Air Sampling and Analysis for Amines
at
Three Homes
in
Clarkston and Waterford, Michigan
for
Phifer Wire Products, Inc.
Tuscaloosa, Alabama

Clayton Project No. 45870.00

Sampling Date: January 18, 1993

| Sample Number | Description | <u>Sampling Period</u> | | Volume (Liters) | Ethyl amine (ppm) | Diethyl amine (ppm) | Methyl amine (ppm) | Dimethyl amine (ppm) |
|------------------|---|------------------------|------|--------------------|-------------------------|---------------------------|--------------------------|----------------------------|
| | | Start | Stop | | | | | |
| PH-2 | 6710 Sun Valley Drive Clarkston, Michigan | 1025 | 1600 | 67.0 | <0.02 | <0.03 | <0.05 | <0.02 |
| PH-6 | 5237 Sun Valley Court Clarkston, Michigan | 1105 | 1620 | 62.0 | <0.03 | <0.03 | <0.05 | <0.03 |
| PH-8 | 6859 Tanglewood Street Waterford, Michigan | 1230 | 1645 | 43.4 | <0.04 | <0.05 | <0.07 | <0.04 |

ppm means parts of contaminant gas or vapor per million parts of air, on a volume-to-volume basis
 < means "less than"

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Table 2
Results of Air Sampling and Analysis for Inorganic Acids
at
Three Selected Homes
in
Clarkston and Waterford, Michigan
for
Phifer Wire Products, Inc.
Tuscaloosa, Alabama

Clayton Project No. 45870.00

Sampling Date: January 18, 1993

| Sample Number | Description | <u>Sampling Period</u> | | Volume (Liters) | Hydrogen fluoride (ppm) | Hydrogen bromide (ppm) | Hydrogen Chloride (ppm) | Nitric acid (ppm) | Phosphoric acid (ppm) |
|---------------|---|------------------------|------|-----------------|-------------------------|------------------------|-------------------------|-------------------|-----------------------|
| | | Start | Stop | | | | | | |
| PH-3 | 6710 Sun Valley Drive Clarkston, Michigan | 1025 | 1600 | 67.4 | <0.05 | <0.06 | <0.13 | <0.08. | <0.099 |
| PH-4 | 5237 Sun Valley Court Clarkston, Michigan | 1105 | 1620 | 65.1 | <0.05 | <0.06 | <0.13 | <0.08 | <0.0099 |
| PH-9 | 6859 Tanglewood Street Waterford, Michigan | 1230 | 1645 | 51.0 | <0.05 | <0.06 | <0.13 | <0.08 | <0.0099 |

ppm means parts of contaminant gas or vapor per million parts of air, on a volume-to-volume basis
 < means "less than"

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**Analytical Data
for
Phifer Wire Products
Clayton Project No. 45870.00/B012107087**

| | | | |
|------------------------|---------------------------|----------------|--------------------|
| Sample Matrix/Media: | Tenax Tubes | Date Sampled: | 1/18/93 |
| Analytical Method: | Thermal Desorption, GC/MS | Date Received: | 1/21/93 |
| Lab Number: | 179223 | Date Analyzed: | 1/27/93 |
| Sample Identification: | PH-1 | Air Volume: | 100 L ^a |

| Volatile Compounds | Concentration ^b | | Limit of |
|----------------------------|----------------------------|----------------------|-------------------|
| | (µg) | (µg/m ³) | Detection (µg) |
| Acetone | <0.1 | <1 | 0.1 |
| Benzene | 0.72 | 7.2 | 0.01 |
| Bromodichloromethane | <0.01 | <0.1 | 0.01 |
| Bromoform | <0.01 | <0.1 | 0.01 |
| 2-Butanone | <0.1 | <1 | 0.1 |
| Carbon Disulfide | <0.01 | <0.1 | 0.01 |
| Carbon Tetrachloride | <0.01 | <0.1 | 0.01 |
| Chlorobenzene | <0.01 | <0.1 | 0.01 |
| 2-Chloroethylvinyl Ether | <0.01 | <0.1 | 0.01 |
| Chloroform | <0.01 | <0.1 | 0.01 |
| Dibromochloromethane | <0.01 | <0.1 | 0.01 |
| 1,1-Dichloroethane | <0.01 | <0.1 | 0.01 |
| 1,2-Dichloroethane | <0.01 | <0.1 | 0.01 |
| 1,1-Dichloroethene | <0.01 | <0.1 | 0.01 |
| 1,2-Dichloroethene (total) | <0.01 | <0.1 | 0.01 |
| 1,2-Dichloropropane | <0.01 | <0.1 | 0.01 |
| cis-1,3-Dichloropropene | <0.01 | <0.1 | 0.01 |
| trans-1,3-Dichloropropene | <0.01 | <0.1 | 0.01 |
| Ethylbenzene | 0.33 | 3.3 | 0.01 |
| 2-Hexanone | <0.05 | <0.5 | 0.05 |
| Methylene Chloride | <0.1 | <1 | 0.1 |
| 4-Methyl-2-Pentanone | <0.05 | <0.5 | 0.05 |
| Styrene | 0.69 | 6.9 | 0.01 |
| 1,1,2,2-Tetrachloroethane | <0.01 | <0.1 | 0.01 |
| Tetrachloroethene | 0.03 | 0.3 | 0.01 |
| Toluene | 0.76 | 7.6 | 0.01 |
| 1,1,1-Trichloroethane | <0.01 | <0.1 | 0.01 |
| 1,1,2-Trichloroethane | <0.01 | <0.1 | 0.01 |
| Trichloroethene | <0.01 | <0.1 | 0.01 |
| Vinyl Acetate | <0.05 | <0.5 | 0.05 |
| Xylenes | 1.2 | 12 | 0.01 |

Analytical Data
for
Phifer Wire Products
Clayton Project No. 45870.00/B012107087

| | | | |
|------------------------|---------------------------|----------------|--------------------|
| Sample Matrix/Media: | Tenax Tubes | Date Sampled: | 1/18/93 |
| Analytical Method: | Thermal Desorption, GC/MS | Date Received: | 1/21/93 |
| Lab Number: | 179223 | Date Analyzed: | 1/27/93 |
| Sample Identification: | PH-1 | Air Volume: | 100 L ^a |

| Compound | Concentration ^b | |
|--|----------------------------|----------------------|
| | (µg) | (µg/m ³) |
| <i><u>Tentatively Identified Compounds^c</u></i> | | |
| C10 Aliphatic Hydrocarbons | 0.51 | 5.1 |
| C9 Aromatic Hydrocarbons | 2.5 | 25 |
| C10 Aromatic Hydrocarbons | 0.02 | 0.2 |
| Limonene | 0.92 | 9.2 |
| Butyl Acetate | 0.65 | 6.5 |
| Hexamethyl Cyclotrisiloxane | 0.04 | 0.4 |
| Benzofuran | 0.27 | 2.7 |

^aAirborne concentrations are based on the air volume provided.

^bResults have been blank corrected.

^cTentatively Identified Compound results are based on nearest internal standard.

**Analytical Data
for
Phifer Wire Products
Clayton Project No. 45870.00/B012107087**

| | | | |
|------------------------|---------------------------|----------------|--------------------|
| Sample Matrix/Media: | Tenax Tubes | Date Sampled: | 1/18/93 |
| Analytical Method: | Thermal Desorption, GC/MS | Date Received: | 1/21/93 |
| Lab Number: | 179224 | Date Analyzed: | 1/27/93 |
| Sample Identification: | PH-5 | Air Volume: | 100 L ^a |

| Volatile Compounds | Concentration ^b | | Limit of |
|----------------------------|----------------------------|----------------------|-------------------|
| | (µg) | (µg/m ³) | Detection (µg) |
| Acetone | <0.1 | <1 | 0.1 |
| Benzene | 0.05 | 0.5 | 0.01 |
| Bromodichloromethane | <0.01 | <0.1 | 0.01 |
| Bromoform | <0.01 | <0.1 | 0.01 |
| 2-Butanone | <0.1 | <1 | 0.1 |
| Carbon Disulfide | <0.01 | <0.1 | 0.01 |
| Carbon Tetrachloride | <0.01 | <0.1 | 0.01 |
| Chlorobenzene | <0.01 | <0.1 | 0.01 |
| 2-Chloroethylvinyl Ether | <0.01 | <0.1 | 0.01 |
| Chloroform | <0.01 | <0.1 | 0.01 |
| Dibromochloromethane | <0.01 | <0.1 | 0.01 |
| 1,1-Dichloroethane | <0.01 | <0.1 | 0.01 |
| 1,2-Dichloroethane | <0.01 | <0.1 | 0.01 |
| 1,1-Dichloroethene | <0.01 | <0.1 | 0.01 |
| 1,2-Dichloroethene (total) | <0.01 | <0.1 | 0.01 |
| 1,2-Dichloropropane | <0.01 | <0.1 | 0.01 |
| cis-1,3-Dichloropropene | <0.01 | <0.1 | 0.01 |
| trans-1,3-Dichloropropene | <0.01 | <0.1 | 0.01 |
| Ethylbenzene | 0.42 | 4.2 | 0.01 |
| 2-Hexanone | <0.05 | <0.5 | 0.05 |
| Methylene Chloride | <0.1 | <1 | 0.1 |
| 4-Methyl-2-Pentanone | <0.05 | <0.5 | 0.05 |
| Styrene | 0.38 | 3.8 | 0.01 |
| 1,1,2,2-Tetrachloroethane | <0.01 | <0.1 | 0.01 |
| Tetrachloroethene | <0.01 | <0.1 | 0.01 |
| Toluene | 3.6 | 36 | 0.01 |
| 1,1,1-Trichloroethane | 30 | 300. | 0.01 |
| 1,1,2-Trichloroethane | <0.01 | <0.1 | 0.01 |
| Trichloroethene | 0.20 | 2.0 | 0.01 |
| Vinyl Acetate | <0.05 | <0.5 | 0.05 |
| Xylenes | 1.7 | 17 | 0.01 |

**Analytical Data
for
Phifer Wire Products
Clayton Project No. 45870.00/B012107087**

| | | | |
|------------------------|---------------------------|----------------|--------------------|
| Sample Matrix/Media: | Tenax Tubes | Date Sampled: | 1/18/93 |
| Analytical Method: | Thermal Desorption, GC/MS | Date Received: | 1/21/93 |
| Lab Number: | 179224 | Date Analyzed: | 1/27/93 |
| Sample Identification: | PH-5 | Air Volume: | 100 L ^a |

| Compound | Concentration ^b | |
|----------|----------------------------|----------------------|
| | (µg) | (µg/m ³) |

Tentatively Identified Compounds^c

| | | |
|----------------------------|------|-----|
| C5 Aliphatic Hydrocarbons | 0.09 | 0.9 |
| C8 Aliphatic Hydrocarbons | 0.12 | 1.2 |
| C10 Aliphatic Hydrocarbons | 0.15 | 1.5 |
| C11 Aliphatic Hydrocarbons | 0.03 | 0.3 |
| C9 Aromatic Hydrocarbons | 0.12 | 1.2 |
| Limonene | 0.13 | 1.3 |
| Pyrrolidine | 0.03 | 0.3 |

^aAirborne concentrations are based on the air volume provided.

^bResults have been blank corrected.

^cTentatively Identified Compound results are based on nearest internal standard.

**Analytical Data
for
Phifer Wire Products
Clayton Project No. 45870.00/B012107087**

| | | | |
|------------------------|---------------------------|----------------|-------------------|
| Sample Matrix/Media: | Tenax Tubes | Date Sampled: | 1/18/93 |
| Analytical Method: | Thermal Desorption, GC/MS | Date Received: | 1/21/93 |
| Lab Number: | 179225 | Date Analyzed: | 1/27/93 |
| Sample Identification: | PH-7 | Air Volume: | 54 L ^a |

| Volatile Compounds | Concentration ^b | | Limit of |
|----------------------------|----------------------------|----------------------|-------------------|
| | (µg) | (µg/m ³) | Detection (µg) |
| Acetone | <0.1 | <2 | 0.1 |
| Benzene | 0.09 | 2 | 0.01 |
| Bromodichloromethane | <0.01 | <0.2 | 0.01 |
| Bromoform | <0.01 | <0.2 | 0.01 |
| 2-Butanone | <0.1 | <2 | 0.1 |
| Carbon Disulfide | <0.01 | <0.2 | 0.01 |
| Carbon Tetrachloride | <0.01 | <0.2 | 0.01 |
| Chlorobenzene | <0.01 | <0.2 | 0.01 |
| 2-Chloroethylvinyl Ether | <0.01 | <0.2 | 0.01 |
| Chloroform | <0.01 | <0.2 | 0.01 |
| Dibromochloromethane | <0.01 | <0.2 | 0.01 |
| 1,1-Dichloroethane | <0.01 | <0.2 | 0.01 |
| 1,2-Dichloroethane | <0.01 | <0.2 | 0.01 |
| 1,1-Dichloroethene | <0.01 | <0.2 | 0.01 |
| 1,2-Dichloroethene (total) | <0.01 | <0.2 | 0.01 |
| 1,2-Dichloropropane | <0.01 | <0.2 | 0.01 |
| cis-1,3-Dichloropropene | <0.01 | <0.2 | 0.01 |
| trans-1,3-Dichloropropene | <0.01 | <0.2 | 0.01 |
| Ethylbenzene | 0.09 | 2 | 0.01 |
| 2-Hexanone | <0.05 | <0.9 | 0.05 |
| Methylene Chloride | <0.1 | <2 | 0.1 |
| 4-Methyl-2-Pentanone | <0.05 | <0.9 | 0.05 |
| Styrene | 0.06 | 1 | 0.01 |
| 1,1,2,2-Tetrachloroethane | <0.01 | <0.2 | 0.01 |
| Tetrachloroethene | <0.01 | <0.2 | 0.01 |
| Toluene | 0.42 | 7.8 | 0.01 |
| 1,1,1-Trichloroethane | 0.01 | 0.2 | 0.01 |
| 1,1,2-Trichloroethane | <0.01 | <0.2 | 0.01 |
| Trichloroethene | <0.01 | <0.2 | 0.01 |
| Vinyl Acetate | <0.05 | <0.9 | 0.05 |
| Xylenes | 0.40 | 7.4 | 0.01 |

**Analytical Data
for
Phifer Wire Products
Clayton Project No. 45870.00/B012107087**

| | | | |
|------------------------|---------------------------|----------------|-------------------|
| Sample Matrix/Media: | Tenax Tubes | Date Sampled: | 1/18/93 |
| Analytical Method: | Thermal Desorption, GC/MS | Date Received: | 1/21/93 |
| Lab Number: | 179225 | Date Analyzed: | 1/27/93 |
| Sample Identification: | PH-7 | Air Volume: | 54 L ^a |

| Compound | Concentration ^b | |
|----------|----------------------------|------------------------------|
| | (μg) | ($\mu\text{g}/\text{m}^3$) |

Tentatively Identified Compounds^c

| | | |
|-----------------------------|------|-----|
| C6 Aliphatic Hydrocarbons | 0.05 | 0.9 |
| C7 Aliphatic Hydrocarbons | 0.33 | 6.1 |
| C9 Aliphatic Hydrocarbons | 0.13 | 2.4 |
| C10 Aliphatic Hydrocarbons | 0.17 | 3.1 |
| C11 Aliphatic Hydrocarbons | 0.07 | 1.3 |
| C13 Aliphatic Hydrocarbons | 0.54 | 10. |
| C9 Aromatic Hydrocarbons | 0.41 | 7.6 |
| C10 Aromatic Hydrocarbons | 0.15 | 2.8 |
| Limonene | 0.45 | 8.3 |
| Hexamethyl Cyclotrisiloxane | 0.07 | 1 |
| Octamethyl Cyclotrisiloxane | 0.02 | 0.3 |

^aAirborne concentrations are based on the air volume provided.

^bResults have been blank corrected.

^cTentatively Identified Compound results are based on nearest internal standard.

**Analytical Data
for
Phifer Wire Products
Clayton Project No. 45870.00/B012107087**

| | | | |
|------------------------|---------------------------|----------------|---------|
| Sample Matrix/Media: | Tenax Tubes | Date Sampled: | 1/18/93 |
| Analytical Method: | Thermal Desorption, GC/MS | Date Received: | 1/21/93 |
| Lab Number: | 179226 | Date Analyzed: | 1/27/93 |
| Sample Identification: | PH-10 Blank | Air Volume: | -- |

| Volatile Compounds | Concentration ^b | | Limit of |
|----------------------------|----------------------------|----------------------|-------------------|
| | (µg) | (µg/m ³) | Detection (µg) |
| Acetone | 0.5 | -- | 0.1 |
| Benzene | <0.01 | -- | 0.01 |
| Bromodichloromethane | <0.01 | -- | 0.01 |
| Bromoform | <0.01 | -- | 0.01 |
| 2-Butanone | <0.1 | -- | 0.1 |
| Carbon Disulfide | <0.01 | -- | 0.01 |
| Carbon Tetrachloride | <0.01 | -- | 0.01 |
| Chlorobenzene | <0.01 | -- | 0.01 |
| 2-Chloroethylvinyl Ether | <0.01 | -- | 0.01 |
| Chloroform | <0.01 | -- | 0.01 |
| Dibromochloromethane | <0.01 | -- | 0.01 |
| 1,1-Dichloroethane | <0.01 | -- | 0.01 |
| 1,2-Dichloroethane | <0.01 | -- | 0.01 |
| 1,1-Dichloroethene | <0.01 | -- | 0.01 |
| 1,2-Dichloroethene (total) | <0.01 | -- | 0.01 |
| 1,2-Dichloropropane | <0.01 | -- | 0.01 |
| cis-1,3-Dichloropropene | <0.01 | -- | 0.01 |
| trans-1,3-Dichloropropene | <0.01 | -- | 0.01 |
| Ethylbenzene | <0.01 | -- | 0.01 |
| 2-Hexanone | <0.05 | -- | 0.05 |
| Methylene Chloride | <0.1 | -- | 0.1 |
| 4-Methyl-2-Pentanone | <0.05 | -- | 0.05 |
| Styrene | <0.01 | -- | 0.01 |
| 1,1,2,2-Tetrachloroethane | <0.01 | -- | 0.01 |
| Tetrachloroethene | <0.01 | -- | 0.01 |
| Toluene | 0.03 | -- | 0.01 |
| 1,1,1-Trichloroethane | <0.01 | -- | 0.01 |
| 1,1,2-Trichloroethane | <0.01 | -- | 0.01 |
| Trichloroethene | <0.01 | -- | 0.01 |
| Vinyl Acetate | <0.05 | -- | 0.05 |
| Xylenes | 0.01 | -- | 0.01 |

APPENDIX D
RESULTS
OF
LABORATORY GAS CHROMATOGRAPHY/MASS SPECTROSCOPY
(GC/MS) STUDY

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Weights and Dimensions
for
Phifer Wire Products

Clayton Project No. 46431-17

Sample Matrix/Media: Screens Date Received: 02/08/93
Analytical Method: TO1 (Modified)

| Sample no. | Temperature (C) | Area (cm2) | Weight (ug) |
|------------|--------------------|---------------|----------------|
| 126823 | 30 | 17.25 | 0.192 |
| 126823 | 50 | 15.81 | 0.162 |
| 126823 | 100 | 5.04 | 0.055 |
| 126824 | 30 | 15.75 | 0.193 |
| 126824 | 50 | 11.07 | 0.143 |
| 126824 | 100 | 8.84 | 0.103 |
| 126825 | 30 | 17.92 | 0.241 |
| 126825 | 50 | 17.10 | 0.210 |
| 126825 | 100 | 10.34 | 0.131 |
| 126826 | 30 | 20.00 | 0.250 |
| 126826 | 50 | 26.00 | 0.320 |
| 126826 | 100 | 8.33 | 0.106 |

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Analytical Results
for
Phifer Wire Products

Clayton Project No. 46431-17

Sample Matrix/Media: Screens Date Prepared: 03/04/93
Lab Number: ----- >C9377 Date Analyzed: 03/04/93
Sample Identification: LAB BLANK
Analytical Method: EPA T01 (Modified)

| <u>Volatile Compounds</u> | <u>Concentration</u> <u>(ug)</u> | <u>Limit of</u> <u>Detection</u> <u>(ug)</u> |
|----------------------------|---------------------------------------|--|
| Acetone | <0.1 | 0.1 |
| Benzene | <0.01 | 0.01 |
| Bromodichloromethane | <0.01 | 0.01 |
| Bromoform | <0.01 | 0.01 |
| 2-Butanone | <0.1 | 0.1 |
| Carbon disulfide | <0.01 | 0.01 |
| Carbon tetrachloride | <0.01 | 0.01 |
| Chlorobenzene | <0.01 | 0.01 |
| Chloroform | <0.01 | 0.01 |
| Dibromochloromethane | <0.01 | 0.01 |
| 1,1-Dichloroethane | <0.01 | 0.01 |
| 1,2-Dichloroethane | <0.01 | 0.01 |
| 1,1-Dichloroethene | <0.01 | 0.01 |
| 1,2-Dichloroethene (total) | <0.01 | 0.01 |
| 1,2-Dichloropropane | <0.01 | 0.01 |
| cis-1,3-Dichloropropene | <0.01 | 0.01 |
| trans-1,3-Dichloropropene | <0.01 | 0.01 |
| Ethylbenzene | <0.01 | 0.01 |
| 2-Hexanone | <0.05 | 0.05 |
| Methylene chloride | <0.05 | 0.05 |
| 4-Methyl-2-pentanone | <0.05 | 0.05 |
| Styrene | <0.01 | 0.01 |
| 1,1,2,2-Tetrachloroethane | <0.01 | 0.01 |
| Tetrachloroethene | <0.01 | 0.01 |
| Toluene | <0.01 | 0.01 |
| 1,1,1-Trichloroethane | <0.01 | 0.01 |
| 1,1,2-Trichloroethane | <0.01 | 0.01 |
| Trichloroethene | <0.01 | 0.01 |
| Vinyl acetate | <0.05 | 0.05 |
| Xylenes (total) | <0.01 | 0.01 |

Analytical Results
for
Phifer Wire Products

Clayton Project No. 46431-17

Sample Matrix/Media: Screens Date Prepared: 03/04/93
Lab Number: ----- >C9377 Date Analyzed: 03/04/93
Sample Identification: LAB BLANK
Analytical Method: EPA T01 (Modified)

Additional Compounds

Concentration
(ug)

| | |
|---------------|------|
| Chloromethane | 0.1 |
| Chloroethene | 0.07 |
| Acetaldehyde | 0.03 |
| Butenal | 0.01 |

Approximate Limit of Detection: 0.01 ug.

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Analytical Results
for
Phifer Wire Products

Clayton Project No. 46431-17

| | | | |
|------------------------|--------------------|----------------|----------|
| Sample Matrix/Media: | Screens | Date Received: | 02/08/93 |
| Lab Number: | 126823 >C9230 | Date Analyzed: | 02/16/93 |
| Sample Identification: | PH-F-1 | Temperature: | 30 |
| Analytical Method: | EPA T01 (Modified) | | |

| <u>Volatile Compounds</u> | <u>Concentration*</u> <u>(ug)</u> | <u>Limit of</u> <u>Detection</u> <u>(ug)</u> |
|----------------------------|--|--|
| Acetone | 0.3 | 0.1 |
| Benzene | 0.07 | 0.01 |
| Bromodichloromethane | <0.01 | 0.01 |
| Bromoform | <0.01 | 0.01 |
| 2-Butanone | 0.1 | 0.1 |
| Carbon disulfide | <0.01 | 0.01 |
| Carbon tetrachloride | <0.01 | 0.01 |
| Chlorobenzene | 0.01 | 0.01 |
| Chloroform | <0.01 | 0.01 |
| Dibromochloromethane | <0.01 | 0.01 |
| 1,1-Dichloroethane | <0.01 | 0.01 |
| 1,2-Dichloroethane | <0.01 | 0.01 |
| 1,1-Dichloroethene | <0.01 | 0.01 |
| 1,2-Dichloroethene (total) | <0.01 | 0.01 |
| 1,2-Dichloropropane | <0.01 | 0.01 |
| cis-1,3-Dichloropropene | <0.01 | 0.01 |
| trans-1,3-Dichloropropene | <0.01 | 0.01 |
| Ethylbenzene | <0.01 | 0.01 |
| 2-Hexanone | 0.05 | 0.05 |
| Methylene chloride | <0.05 | 0.05 |
| 4-Methyl-2-pentanone | <0.05 | 0.05 |
| Styrene | 0.01 | 0.01 |
| 1,1,2,2-Tetrachloroethane | <0.01 | 0.01 |
| Tetrachloroethene | <0.01 | 0.01 |
| Toluene | 0.02 | 0.01 |
| 1,1,1-Trichloroethane | <0.01 | 0.01 |
| 1,1,2-Trichloroethane | <0.01 | 0.01 |
| Trichloroethene | <0.01 | 0.01 |
| Vinyl acetate | <0.05 | 0.05 |
| Xylenes (total) | <0.01 | 0.01 |

* Results are blank corrected.

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Analytical Results
for
Phifer Wire Products

Clayton Project No. 46431-17

| | | | |
|------------------------|--------------------|----------------|----------|
| Sample Matrix/Media: | Screens | Date Received: | 02/08/93 |
| Lab Number: | 126823 >C9230 | Date Analyzed: | 02/16/93 |
| Sample Identification: | PH-F-1 | Temperature: | 30 |
| Analytical Method: | EPA T01 (Modified) | | |

Additional Compounds

Concentration*
(ug)

| | |
|-------------------------|-----|
| Phthalic anhydride | 5 |
| C11H22 hydrocarbons | 2 |
| C12H24 hydrocarbons | 2 |
| Butenone | 1 |
| Acetic acid | 0.9 |
| Unknown compounds | 0.7 |
| Ethyl hexanol | 0.4 |
| Possible Methyl sulfone | 0.2 |
| Octanal | 0.2 |

* Results are blank corrected.
Approximate Limit of Detection: 0.01 ug.

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Analytical Results
for
Phifer Wire Products

Clayton Project No. 46431-17

| | | | |
|------------------------|--------------------|----------------|----------|
| Sample Matrix/Media: | Screens | Date Received: | 02/08/93 |
| Lab Number: | 126823 >C9229 | Date Analyzed: | 02/16/93 |
| Sample Identification: | PH-F-1 | Temperature: | 50 |
| Analytical Method: | EPA T01 (Modified) | | |

| <u>Volatile Compounds</u> | <u>Concentration*</u> <u>(ug)</u> | <u>Limit of</u> <u>Detection</u> <u>(ug)</u> |
|----------------------------|--|--|
| Acetone | 0.3 | 0.1 |
| Benzene | 0.16 | 0.01 |
| Bromodichloromethane | <0.01 | 0.01 |
| Bromoform | <0.01 | 0.01 |
| 2-Butanone | 0.1 | 0.1 |
| Carbon disulfide | <0.01 | 0.01 |
| Carbon tetrachloride | <0.01 | 0.01 |
| Chlorobenzene | 0.01 | 0.01 |
| Chloroform | <0.01 | 0.01 |
| Dibromochloromethane | <0.01 | 0.01 |
| 1,1-Dichloroethane | <0.01 | 0.01 |
| 1,2-Dichloroethane | <0.01 | 0.01 |
| 1,1-Dichloroethene | <0.01 | 0.01 |
| 1,2-Dichloroethene (total) | <0.01 | 0.01 |
| 1,2-Dichloropropane | <0.01 | 0.01 |
| cis-1,3-Dichloropropene | <0.01 | 0.01 |
| trans-1,3-Dichloropropene | <0.01 | 0.01 |
| Ethylbenzene | <0.01 | 0.01 |
| 2-Hexanone | 0.11 | 0.05 |
| Methylene chloride | <0.05 | 0.05 |
| 4-Methyl-2-pentanone | <0.05 | 0.05 |
| Styrene | 0.04 | 0.01 |
| 1,1,2,2-Tetrachloroethane | <0.01 | 0.01 |
| Tetrachloroethene | <0.01 | 0.01 |
| Toluene | <0.01 | 0.01 |
| 1,1,1-Trichloroethane | <0.01 | 0.01 |
| 1,1,2-Trichloroethane | <0.01 | 0.01 |
| Trichloroethene | <0.01 | 0.01 |
| Vinyl acetate | <0.05 | 0.05 |
| Xylenes (total) | <0.01 | 0.01 |

* Results are blank corrected.

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Analytical Results
for
Phifer Wire Products

Clayton Project No. 46431-17

| | | | |
|------------------------|--------------------|----------------|----------|
| Sample Matrix/Media: | Screens | Date Received: | 02/08/93 |
| Lab Number: | 126823 >C9229 | Date Analyzed: | 02/16/93 |
| Sample Identification: | PH-F-1 | Temperature: | 50 |
| Analytical Method: | EPA T01 (Modified) | | |

Additional Compounds

Concentration*
(ug)

| | |
|---------------------------------------|-----|
| Nonanal | 1 |
| C11H22 hydrocarbons | 1 |
| Acetic acid | 1 |
| C12H24 hydrocarbons | 0.8 |
| C9H14O dienals | 0.5 |
| Butenone | 0.5 |
| Ethyl hexanal and Unknown hydrocarbon | 0.4 |
| Hexanal | 0.4 |
| Heptanal | 0.3 |
| Ethyl hexanol | 0.3 |
| Unknown compound | 0.2 |
| Possible Methyl sulfone | 0.2 |

* Results are blank corrected.
Approximate Limit of Detection: 0.01 ug.

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